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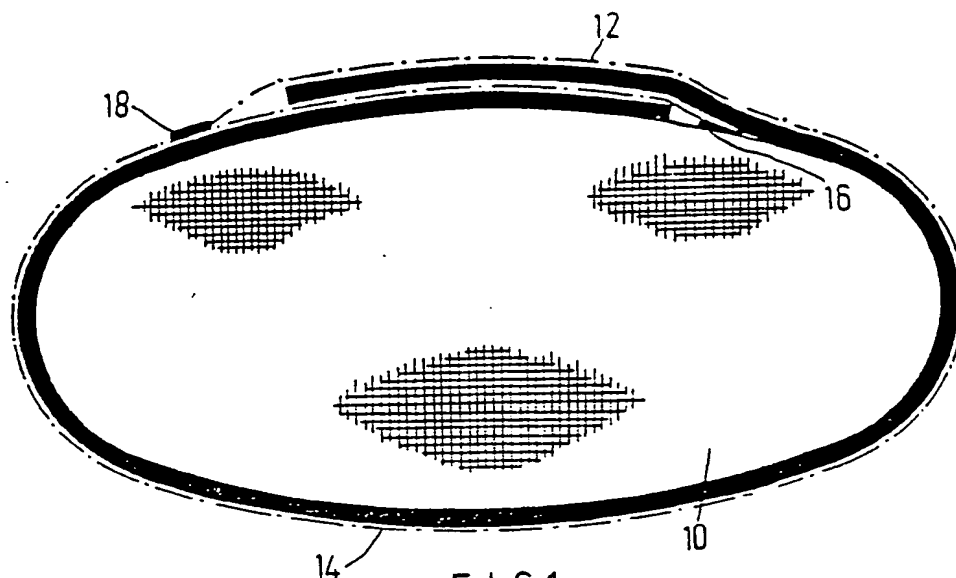
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(54) Method of protecting a part by wrapping it in a fibrous material, and part protected thereby.

(57) A catalytic converter block 10 is wrapped in a loose laminate of plastics material 12 and a mat fibrous material 14, the plastics material being secured to the block at one end and continuing beyond the mat of fibrous material to cover same completely. The plastics material is secured under tension so as to compress the fibrous material to facilitate fitting in a casing for the converter block.



**FIG.1**

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**EP 0 299 626 A2**

## Fibrous material packaging

This invention concerns fibrous material packaging, such as of ceramic and mineral fibres, a method of making same and their use.

Ceramic and mineral fibrous materials are used, for example, in catalytic converters for motor vehicles. Such catalytic converters are for the treatment of exhaust gases to render them substantially harmless before emission to atmosphere. Treatment is by passing the exhaust gases through a chamber enclosing a porous ceramic block whose pores are coated with a suitable catalyst.

The fibrous material surrounds the ceramic block in order to insulate it from colder temperatures outside the converter, to provide sound proofing and to cushion the ceramic block against expansion and contraction of the chamber.

A commonly used fibrous material is that sold under the trade name SAFFIL which is 95% alumina and provided as a low density mat. In the manufacture of some catalytic converters for motor vehicles a sheet of the fibrous material is laid on one half of the chamber, the ceramic block placed in that half of the chamber, the sheet folded over the block and the other half of the chamber placed on top. The two chamber halves are then pressed together hydraulically so that the edges thereof can be welded together.

The ends of the fibrous material sheet are supposed to meet when folded over the ceramic block. However, as the material is being compressed and folded over more or less at the same time, the ends of the sheet do not always meet. This can leave an area of the ceramic block not afforded the above-mentioned protection.

Furthermore, due to the fibrous nature of the material, a certain amount of disintegration of the sheet occurs during the manufacturing of catalytic converters.

A certain amount of compression of the fibrous material is, however, desirable so that there is a reasonably secure fit for the ceramic block in the chamber, i.e. so that it will not shake about.

Proposals have been made in our U.K. Patent Specification No. 2171180A for wrapping and sealing the fibrous material under vacuum or at least reduced pressure in a substantially air impervious material, such as a plastics envelope or pouch. The resultant package was easier to handle and being compressed easier to wrap around the ceramic block.

However, as very little oxygen passes through a catalytic converter during use, the plastics material was not burnt off but formed discrete globules that caused hard areas within the fibrous material. These hard areas impaired the action of the

fibrous material.

An object of this invention is to provide a way of installing fibrous material so that the above mentioned problems are overcome or at least reduced.

According to the invention fibrous material in mat form is wrapped around a part to be covered, such as a catalytic converter ceramic block, in a loose laminate with a layer of plastics material, the plastics material continuing beyond the fibrous material to cover same completely.

In a preferred embodiment, the fibrous material is laid on a longer length of plastics material and the two layers wrapped around the part to be covered the plastics material continuing to be wrapped around the part after the fibrous material is all wrapped so as to cover the fibrous material completely.

The plastics layer is preferably firstly adhered to the part to be wrapped. Any suitable adhesive or adhesive means may be used for this but double-sided adhesive tape has been found to be quite suitable for that purpose. The plastics layer can then be wrapped under tension so as to compress the fibrous material. Further adhesive means, such as double-sided adhesive tape, may then be provided for the other end of the plastics layer in order to maintain said tension and hence compression of the fibrous material when wrapping has been completed.

The plastics material for use in the invention need not be very thick but preferably has sufficient tensile strength for compression of the fibrous material without significant stretching. It is envisaged that plastics layers of say 10-20  $\mu$  thick may be used in the invention. Within this range of thicknesses, it is believed that burning off of the plastics material in say a catalytic converter may be possible and that, even if complete burning off of the plastics material is not possible, the amount of plastics material remaining is so small as to cause little or no unwanted contamination of the fibrous material.

Another important feature of the plastics material at least for use in wrapping catalytic converter blocks is that upon decomposing no harmful substances are released i.e. that could contaminate the ceramic block of the converter.

Particularly suitable plastics material for use in the present invention will be those based on carbon and hydrogen only and possibly also on oxygen. Polypropylene has been found to be especially suitable as the plastics material.

Referring to the wrapping of catalytic converter blocks in accordance with the invention and particularly to oval section converter blocks to be

encased in half shells, to facilitate fitting a wrapped converter block it is advantageous to have the fibrous material compressed most at the sides of the converter rather than at the top or bottom. The wrapping proposed by the present invention actually provides the desired compression due to the shape of the converter block, i.e. the tension applied to the plastics layer has a greater inwards component on the more sharply curved sides of the converter block rather than on the shallower curves at the top and bottom of the converter block.

A problem noted with respect to particularly oval section catalytic converters is the variation in heat expansion rates over the half shells or casing of the converter. The rate of heat expansion of the casing in its flatter regions is, in fact, greater than that of its more curved ends. Thus, in use, the amount of fibrous material between the converter block and the flatter regions of the casing, will not necessarily be sufficient to provide the desired protection of the converter block or exhaust gas leakage.

It may, therefore, be advantageous to provide greater thickness of fibrous material over flatter regions of a converter block than elsewhere. That may be achieved by providing separate pads of fibrous material on the flatter regions of the converter block either above or below a wrapping of the invention.

Alternatively separate wrappings according to the invention may be used that overlap over the flatter regions of the converter block only.

Another alternative may be to provide a pad of fibrous material on one of the flatter regions of the block and then provide a wrapping according to the invention that overlaps over the opposite flatter region to that which is provided with the pad of fibrous material.

The extra thickness of fibrous material over the flatter regions of the converter block can, thus, compensate for the greater expansion of the casing in those regions by expanding to fill the resultant space, as the fibrous material is usually fitted initially in a compressed state.

The invention also comprehends a catalytic converter block wrapped in accordance with the invention as well as a catalytic converter comprising a wrapped catalytic converter block.

Any number of turns of plastics and fibrous material may be used to complete a wrapping. In catalytic converters, the amount of fibrous material used is usually determined by weight rather than thickness so that as many turns as necessary to wrap the desired weight of material around a converter block will be used provided, of course, that at least one layer of fibrous material completely surrounds the block.

The invention will now be further described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows in section a catalytic converter wrapped according to a first embodiment;

Figure 2 shows in section a catalytic converter wrapped according to a second embodiment;

Figure 3 shows in section a catalytic converter wrapped according to a third embodiment; and

Figure 4 shows in section a catalytic converter wrapped according to a fourth embodiment.

Referring to Figure 1 of the accompanying drawings, a catalytic converter block 10, of the type usually housed in metal half shells welded together is wrapped in a loose laminate of a layer of plastics material 12, such as polypropylene of 10-20  $\mu$  thickness, and a layer of SAFFIL fibre 14. The plastics material layer 12 is fixed to the block 10 by means of a strip of double-sided adhesive tape 16. The plastics material layer is longer than the fibrous material layer 14 so that when the laminate is wound around the block, the plastics layer continues beyond the fibrous material to completely cover it. The end of the plastics layer is then fixed down with another strip of double-sided adhesive tape 18.

The plastics layer is kept under tension during wrapping, so that the fibrous material layer is compressed. Compression of the fibrous material will be greater at the sides of the block 10 rather than at the top or bottom and this will facilitate fitting the wrapped block between catalytic converter half shells.

Turning to Figure 2 of the accompanying drawings, an oval section catalytic converter block 20, of the type usually housed in metal half shells welded together, has on both of its sides of shallowest curvature a pad of Saffil fibre 22 and an overall wrapping of a loose laminate of a layer of plastics material 24 such as polypropylene of 10 to 20  $\mu$  thickness, and a layer of Saffil fibre 26 which actually overlaps at its ends. The plastics material 24 is longer than the fibre 26 and is secured under tension at each end by means of double-sided adhesive as at 28 and 30.

The pads 22 provide extra thickness of Saffil fibre on the "flatter" parts of the converter block to compensate for greater and outward distortion of the converter half shells in those regions.

The embodiment of Figure 3 addresses the same problem as that of Figure 2, namely compensating for distortion of the converter half shells by providing additional thickness of Saffil fibre over the "flatter" regions of a catalytic converter block 40. In this embodiment a first partial wrapping of a loose laminate 41 of a plastics sheet 42 and Saffil fibre mat 43 is laid on the block 40 that extends

over both flatter sides of the block and one intermediate end of the block and then a second loose laminate 45 of plastics sheet 46 and Saffil fibre 47 is laid on top of that again covering the flatter sides of the block but covering the opposite intermediate end of the block to the first wrap. Both wrappings 41 and 45 have the plastics sheet longer than the fibrous material and the ends of the plastics sheet are secured under tension by means of double sided adhesive tape 49.

Finally, in Figure 4 of the accompanying drawings, which again is aimed at the problem of compensating for greater expansion of the converter half shells over the flatter regions of the converter, a pad 50 of Saffil fibre is laid on one of the flatter surfaces of a catalytic converter block 52. Then a loose laminate 54 of Saffil fibre 56 and plastics sheet 58 is wrapped around the block 52 starting from the opposite side of the block to that on which the pad 50 has been placed. The wrapping is continued around the block to cover the pad 50 and to overlap itself so that two thicknesses of fibrous material are provided on the opposing flatter region of the converter block.

The laminate 54 has the plastics sheet 58 longer than the fibrous material at each end and the plastics sheet is secured under tension by means of double sided adhesive tape 60 at each end.

Clearly there will be other ways than illustrated above of achieving greater thicknesses of fibrous material over the flatter regions of converter blocks and these are considered to be within the spirit and scope of the present invention.

Furthermore, whilst the invention has been exemplified with reference to catalytic converters, it will be appreciated that the present invention will have wider application.

## Claims

1. A method of protecting a part comprising wrapping same in a layer of fibrous material, wherein a loose laminate of a layer of plastics material and a mat of fibrous material are wrapped about said part, the plastics layer continuing beyond the fibrous material to cover same completely.

2. A method as claimed in claim 1, wherein the fibrous material is laid on a longer length of plastics material and the two layers wrapped around the part to be covered the plastics material continuing to be wrapped around the part after the fibrous material is all wrapped so as to cover the fibrous material completely.

3. A method as claimed in claim 1 or 2, wherein the plastics layer is firstly adhered to the part to be wrapped.

4. A method as claimed in claim 3, wherein the plastics layer is adhered to said part by means of double-sided adhesive tape.

5. A method as claimed in any one of claims 1 to 4, wherein the plastics layer is wrapped under tension.

6. A method as claimed in any one of claims 1 to 5, wherein the plastics material has a thickness of 10 to 20 $\mu$ .

7. A method as claimed in any one of claims 1 to 6, wherein the plastics material is based on carbon and hydrogen only.

8. A method as claimed in claim 7, wherein the plastics material is polypropylene.

9. A method as claimed in any one of claims 1 to 8 comprising providing greater thickness of fibrous material over flatter regions of said part than elsewhere.

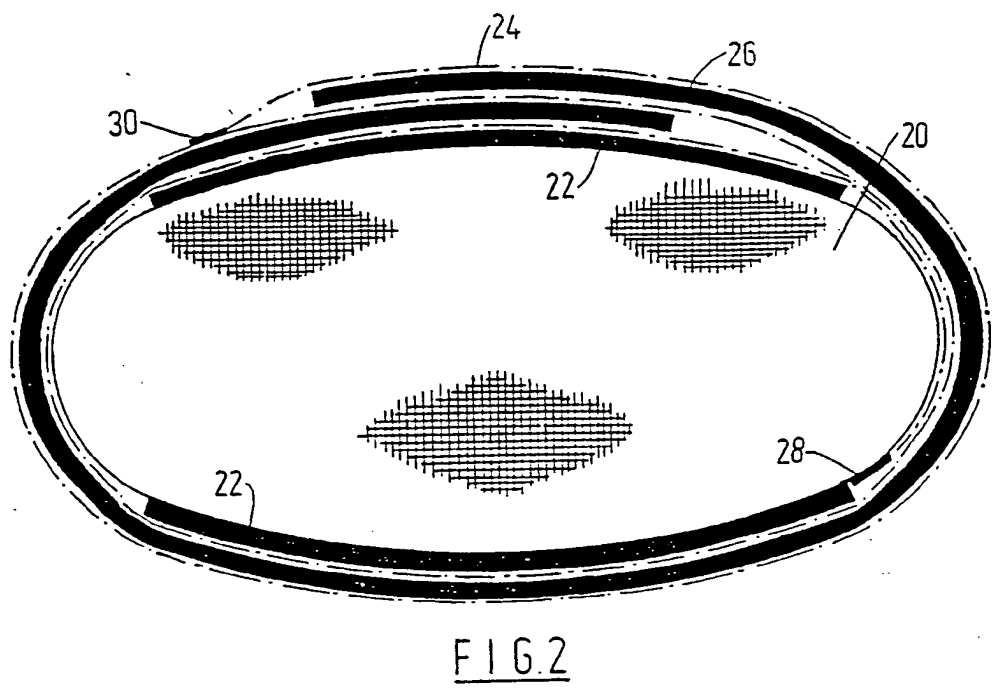
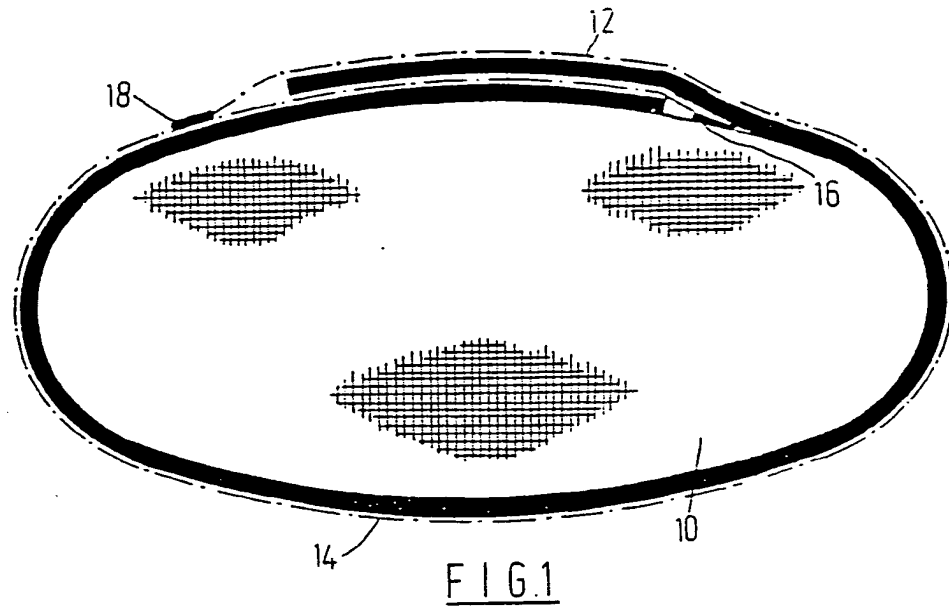
10. A method as claimed in claim 9 comprising providing separate pads of fibrous material on the flatter regions of the part either above or below a main wrapping.

11. A method as claimed in claim 9, comprising providing separate wrappings that overlap over the flatter regions of the part only.

12. A method as claimed in claim 9 comprising providing a pad of fibrous material on one of the flatter regions of the part and then providing a wrapping that overlaps over an opposite flatter region to that which is provided with the pad of fibrous material.

13. A catalytic converter block wrapped in accordance with a method as claimed in any one of claims 1 to 12.

14. A catalytic converter comprising a catalytic converter block as claimed in claim 13.



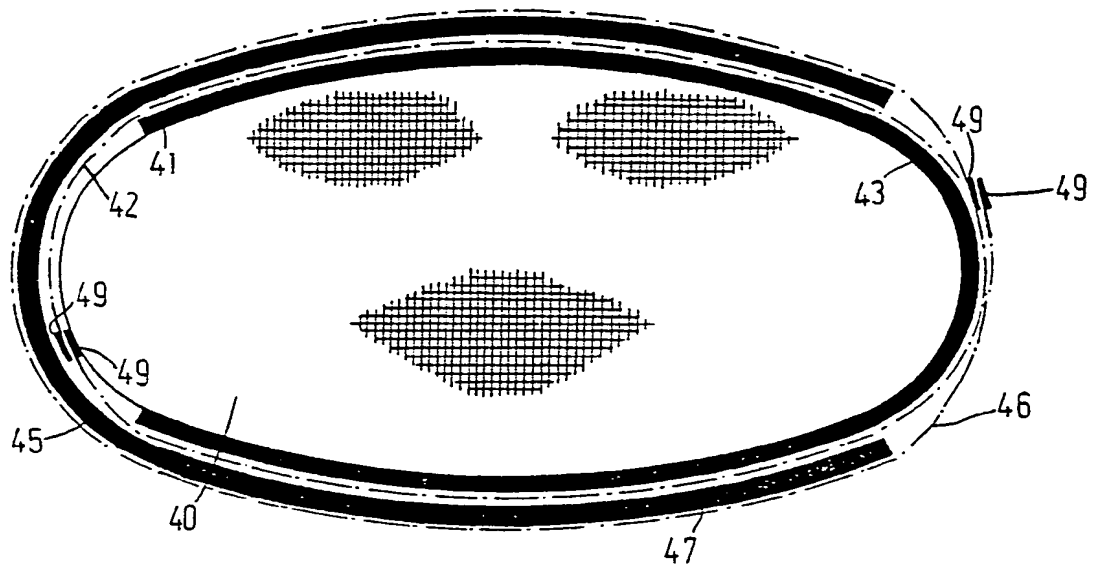


FIG. 3

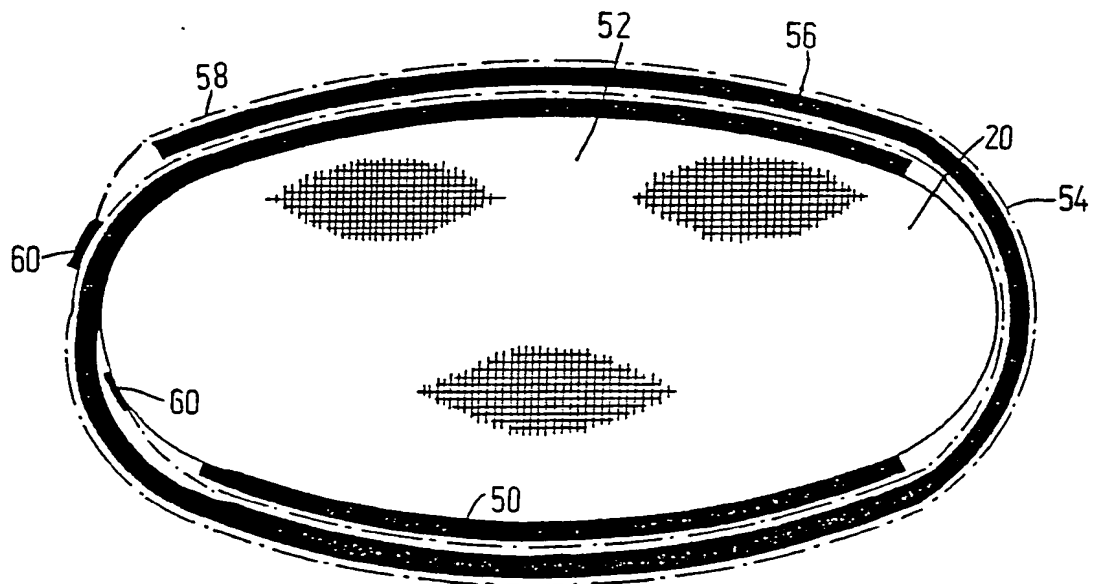


FIG. 4

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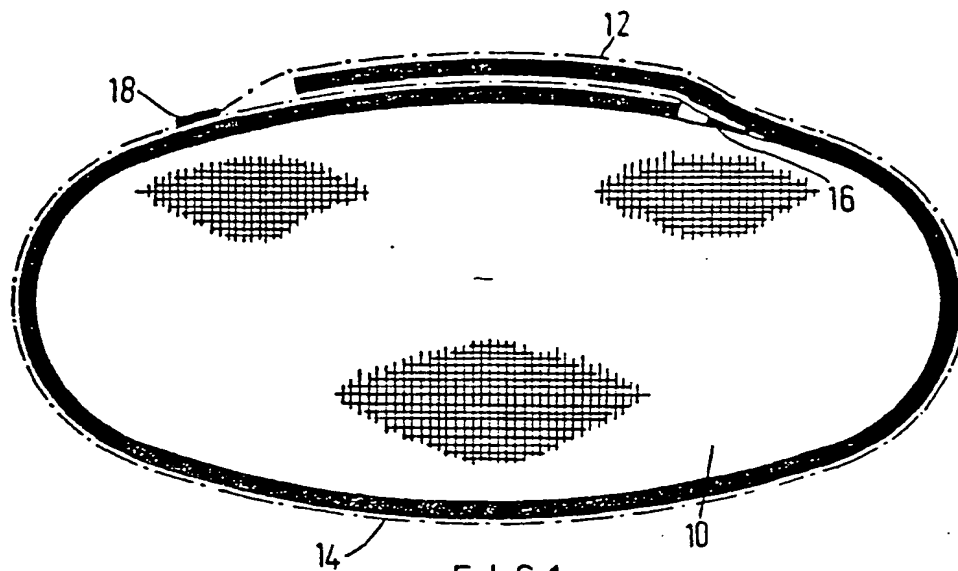


FIG. 1

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DOCUMENTS CONSIDERED TO BE RELEVANT			EP 88305497.5
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	<u>DE - C2 - 2 633 325</u> (RHEINHOLD & M.) * Claim 1; fig. 1 * --	1	B 65 D 75/38 B 65 D 75/26 F 01 N 3/28
A	<u>CH - A5 - 563 548</u> (BUNZL & B.) * Claims 1,2 * --	1	
A	<u>US - A - 4 462 444</u> (LARSON) * Claim 1; fig. 2 * --	1	
A	<u>EP - A2 - 0 192 417</u> (W.F.J. REFRAC. LTD.) * Totality * D & GB-A-2 171 180 --	1;13, 14	
A	<u>DE - A1 - 3 521 467</u> (G + H MONT.) * Claim 1 * --	1;13	
A	<u>GB - A - 1 446 591</u> (BRIT. LEYLAND) * Claim 1 * --	1;13, 14	TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
A	<u>GB - A - 1 462 091</u> (UOP INC.) * Claim 1 * ----	1,13, 14	B 65 D 75/00 B 65 D 81/00 B 65 D 85/00 F 01 N 3/00 F 01 N 7/00 F 16 L 59/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 25-10-1989	Examiner MELZER
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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